









How to enable Distributed Energy Resources (DER) that address power system challenges?

DER refers to any resource connected at the electricity distribution network level (e.g., community solar, water heaters, electric vehicles) and can provide various benefits such as emission reductions, cost savings, increased flexibility & resilience. DER-enabling interventions that are designed to address local pain points can accelerate deployment which brings environmental, energy security and economic benefits to communities.

Power System Pain Point	 Supply shortage during peak electricity periods	 Long waiting times for new power projects	 Expensive procurement of conventional plants with low utilization to cover peak demand	 Curtailment in moments of high renewable energy (RE) output	 Impact of extreme weather events on grid infrastructure leading to outages	 Low connectivity and high reliance on fossil fuels in islands & rural areas	 Stress on the grid due to large number of electric vehicles (EV) charging during peak hours	 Mismatch between customer demand and supply of renewable energy
Cost Effective Sample DER Use Case	Use DER capabilities during peak demand through measures such as demand response, net billing tariffs, and smart product standards	Streamline licensing rules and promote the use of DER that can increase supply and reduce demand (e.g., net billing tariffs).	Encourage more demand response to manage peak periods and enable more investment in RE.	Correlate demand-side flexibility with RE supply, using tariffs that reward flexibility and updating market-access rules.	Incentivize DER in locations that improve grid resiliency.	Integrate DER solutions into grid planning and cost/benefit analysis, especially in low density regions and isolated networks.	Use EV tariffs to incentivize smart charging that can reduce peak electricity demand.	Incentivize DER with tariffs that provide flexibility to balance out existing supply/demand needs.
Case Study	Oregon's utilities manage peak demand by requiring electric water heaters to be grid integrated.	South Africa removed its licensing requirements and many municipalities now offer DER net billing tariffs for rooftop solar.	Thailand is testing demand response to increase power system flexibility and promote more renewable energy.	The UK provides incentives for smart thermostats in homes to manage peak demand.	New York uses microgrids and cogeneration to increase resiliency at critical sites with various support programs (grants, technical assistance for feasibility).	Western Australia developed a Roadmap to integrate DER into system planning and reduce grid expansion costs.	Norway and the UK use dynamic time-of-use pricing aligned with the wholesale market and encourage EV charging peak renewable energy supply.	Western Australia piloted neighborhood storage (large ground or small pole-mounted batteries) to improve reliability and increase solar hosting.
DER Enabling Interventions	<div>Time-of-use (TOU) Tariffs</div> <div>DER Net Billing Tariffs</div> <div>Grid Planning including DER; Updated Grid Codes</div> <div>Remove Licensing Barriers</div> <div>EV Tariffs</div> <div>Product Standards</div> <div>Demand Response (DR)</div> <div>Demand Shifting</div> <div>Virtual Power Plants</div> <div> Legend for Typical Implementing Body *: <ul style="list-style-type: none"> Regulator Regulator or Ministry Utility System Operator Standard Setting Body (e.g. NPO, gov.) </div>							

DERs are an extra tool for utilities, regulators, customers and governments that allows them to reduce costs and address power system pain points. For more information on DER integration see the RAP's report on "[Integrate to zero: Policies for on-site, on-road, on-grid distributed energy resource integration.](#)"

Notes: DER benefits depend on perspective (e.g., customer, system planner, system operations, market), and this graphic assumes the perspective of the system operator. Time-of-Use (TOU) and net billing tariffs refer to electricity rates that incentivize flexibility and demand aligned with availability of renewable energy (RE).

* The implementing organization can vary based on local market dynamics for each power system, but the common organizations are listed here.